

Control Data® 9410

Finch™ Eight-Inch Fixed Disk Drive

MAY - 1981
3/81
CONTROL DATA

The Control Data Model 9410 Finch Disk Drive is an eight-inch rigid disk drive that provides 8 or 24 megabytes of unformatted storage on fixed, lubricated media in a sealed recording environment.

The Model 9410 mounts vertically or horizontally in the same space as an eight-inch flexible disk drive. The Finch digital interface is intended to be attached to a single controller capable of controlling both a 9410 and a flexible disk drive.

Features

- Full data recovery circuitry
- Sealed disk, head and actuator chamber
- No preventive maintenance required
- LSI circuitry
- Low noise for office use
- Vertical or horizontal mounting
- Less than 350 BTU power dissipation
- Rotary voice coil actuator
- User-defined sectoring

Functional Description

The 9410 has one (8 megabytes) or two (24 megabytes) disks located in an environmentally sealed chamber; no unfiltered outside air is drawn into the unit. Air is recirculated within the disk/actuator chamber and passes through a filter to ensure a contamination-free environment. A rotary voice coil actuator provides rapid access and positioning accuracy.



The use of large scale integrated (LSI) circuitry and microprocessor control means that only three circuit boards are used. Phase-locked oscillator data recovery and reference clocking increases data integrity.

The 9410 can be configured with up to four drives in a star or daisy-chain configuration. The interface also allows the 9410 to be placed in a daisy-chain configuration with flexible disk drives.

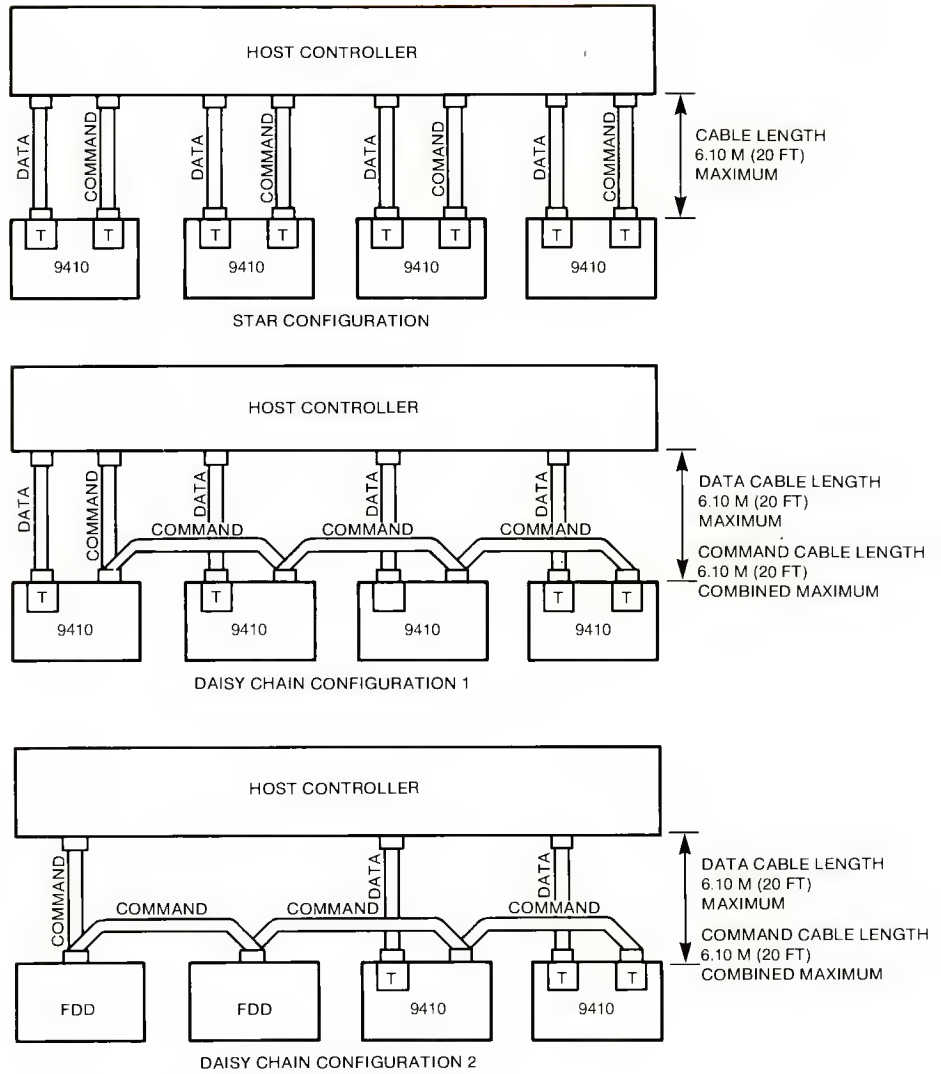
Applications

- Memory extension
- Word processing
- Small business systems
- Terminal systems
- Flexible disk drive system enhancement

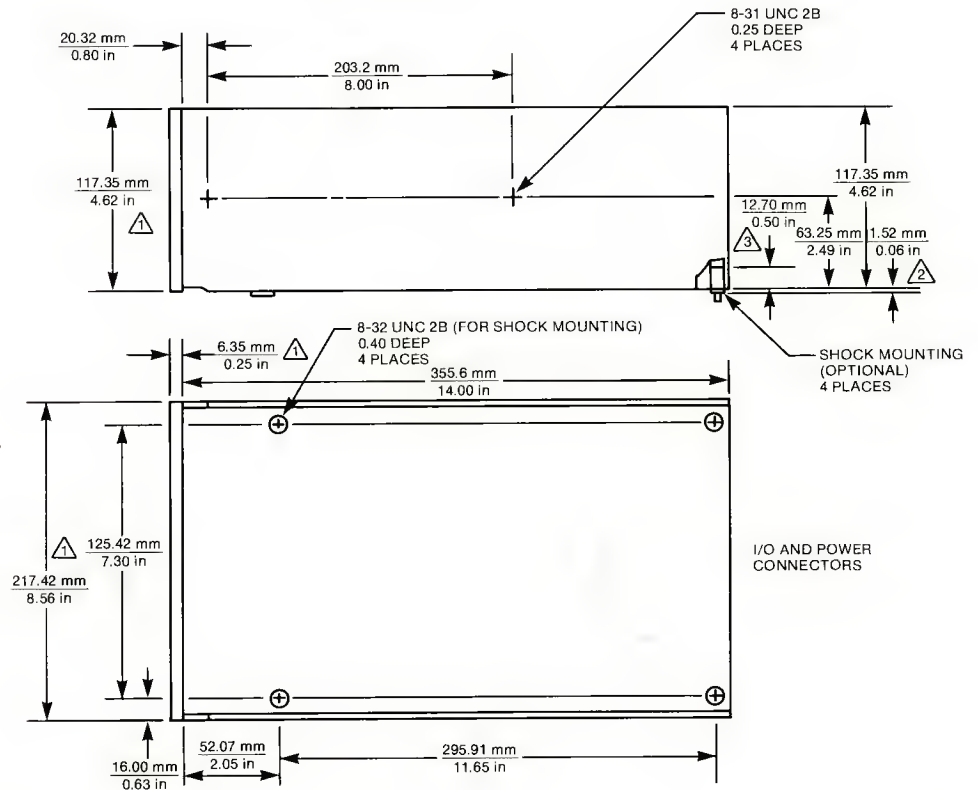
Options/Accessories

- Shock mounts
- I/O cables
- Power supply
- Power cable
- Hardware maintenance manuals
- Suitcase tester

Configuration Options



NOTE: T INDICATES TERMINATOR RESISTOR PACK.



- 1 OPTIONAL FRONT PANEL
- 2 NOMINAL MOUNTING, NO SHOCKS,
RIGHT SIDE ONLY
- 3 NOMINAL SHOCK MOUNTING
PROTRUSION

Command Cable Interface

DASH 1 INTERFACE

CONTROLLER/ HOST INTERFACE	SIGNAL DIRECTION	SIGNAL DIRECTION	SIGNAL PIN NO.	GROUND PIN NO.
	← NA		2	1
	← RETURN TO ZERO (RTZ)		4	3
	← NA		6	5
	← INDEX		8	7
	← NA		10	9
	→ STEP		12	11
	→ DIRECTION		14	13
	→ WRITE ENABLE		16	15
	← NA		18	17
	→ UNIT SELECT -1		20	19
	→ UNIT SELECT -2		22	21
	→ UNIT SELECT -3		24	23
	→ UNIT SELECT -4		26	25
	← UNIT READY -1		28	27
	← UNIT READY -2		30	29
	← UNIT READY -3		32	31
	← UNIT READY -4		34	33
	← NA		36	35
	→ READ ENABLE		38	37
	→ HEAD SELECT 2°		40	39
	→ HEAD SELECT 2'		42	41
	→ RESERVED FOR FACTORY USE		43	—
	← WRITE FAULT		44	—
	← NA		45	—
	→ FAULT RESET		46	—
	← NA		47	—
	← BYTE CLOCK		48	—
	← DISK TYPE		50	49
			9410 COMMAND CONNECTOR*	

NA—NOT APPLICABLE TO THE 9410 BUT IS USED BY THE FDD.

* — ALL SIGNALS IN THE COMMAND CABLE ARE SINGLE-ENDED SIGNALS.

Data Cable Interface

DASH 1 INTERFACE

CONTROLLER/ HOST INTERFACE	SIGNAL DIRECTION	SIGNAL DIRECTION	PIN NO.	TYPE*
	← INDEX		1	SE
	← GROUND		2	
	← BYTE CLOCK		3	SE
	← GROUND		4	
	→ EARLY DATA STROBE ENABLE		5	SE
	→ LATE DATA STROBE ENABLE		6	SE
	← UNIT SELECTED		7	SE
	← GROUND		8	
	→ WRITE DATA "+"		9	DIFF
	→ WRITE DATA "-"		10	DIFF
	← GROUND		11	
	→ WRITE CLOCK "+"		12	DIFF
	→ WRITE CLOCK "-"		13	DIFF
	← GROUND		14	
	← SERVO/READ CLOCK "+"		15	DIFF
	← SERVO/READ CLOCK "-"		16	DIFF
	← GROUND		17	
	→ READ DATA "+"		18	DIFF
	→ READ DATA "-"		19	DIFF
	← GROUND		20	
			9410 DATA CONNECTOR*	

*SE = SINGLE-ENDED SIGNAL
DIFF = DIFFERENTIAL SIGNAL

Command Cable Interface

DASH 3 INTERFACE

CONTROLLER/ HOST INTERFACE	SIGNAL DIRECTION	SIGNAL DIRECTION	SIGNAL PIN NO.	GROUND PIN NO.
	→ RESERVED FOR FUTURE USE		2	1
	→ READ ENABLE		4	3
	→ FAULT RESET		6	5
	→ HEAD SELECT 2'		8	7
	← TWO DISKS		10	9
	← RESERVED FOR FUTURE USE		12	11
	→ HEAD SELECT 2°		14	13
	← NA		16	15
	→ RETURN TO ZERO		18	17
	← INDEX		20	19
	← DRIVE READY		22	21
	← BYTE CLOCK		24	23
	→ DRIVE SELECT 1		26	25
	→ DRIVE SELECT 2		28	27
	→ DRIVE SELECT 3		30	29
	→ DRIVE SELECT 4		32	31
	→ DIRECTION		34	33
	→ STEP		36	35
	← NA		38	37
	→ WRITE ENABLE		40	39
	← NA		42	41
	← NA		44	43
	← NA		46	45
	← WRITE FAULT		48	47
	← NA		50	49
			9410 COMMAND CONNECTOR*	

EDGE CONNECTOR

* — ALL SIGNALS IN THE COMMAND CABLE ARE SINGLE-ENDED SIGNALS.

Data Cable Interface

DASH 3 INTERFACE

CONTROLLER/ HOST INTERFACE	SIGNAL DIRECTION	SIGNAL DIRECTION	PIN NO.	TYPE*
	← INDEX		1	SE
	← GROUND		2	
	← BYTE CLOCK		3	SE
	← GROUND		4	
	→ EARLY DATA STROBE ENABLE		5	SE
	→ LATE DATA STROBE ENABLE		6	SE
	← UNIT READY		7	SE
	← GROUND		8	
	→ WRITE DATA "+"		9	DIFF
	→ WRITE DATA "-"		10	DIFF
	← GROUND		11	
	→ WRITE CLOCK "+"		12	DIFF
	→ WRITE CLOCK "-"		13	DIFF
	← GROUND		14	
	← SERVO/READ CLOCK "+"		15	DIFF
	← SERVO/READ CLOCK "-"		16	DIFF
	← GROUND		17	
	→ READ DATA "+"		18	DIFF
	→ READ DATA "-"		19	DIFF
	← GROUND		20	
			9410 DATA CONNECTOR*	

3M CONNECTOR

*SE = SINGLE-ENDED SIGNAL
DIFF = DIFFERENTIAL SIGNAL

Specifications

Performance

Transfer Rate	6.45 Mbits/s
Spindle Speed	3,600 r/min

Access Time (at 50 kHz step pulse rate)

Maximum, Full Stroke	100 ms
Average	50 ms
Maximum, One Track	10 ms

Functional

	<u>9410-8</u>	<u>9410-24</u>
Number of Disks	1	2
Total Surfaces	2	4
Data Surfaces	1	3
Servo Surfaces	1	1
Capacity, Unformatted	8 Mb	24 Mb
Per Surface	8 Mb	8 Mb
Per Track	13,440 bytes	13,440 bytes
Recording		
Track Density	554 Tracks per/in	554 Tracks per/in
Tracks Per Surface	605	605
Recording Method	NRZ at interface, MFM on disk	NRZ at interface, MFM on disk
Positioning Method	Rotary voice coil actuator	Rotary voice coil actuator
Reliability		
MTBF	10,000 hours	
Service Life	5 years or 30,000 hours	
Preventive Maintenance	None	
Adjustments	None	
Data Reliability		
Recoverable Read Errors	Less than 1 in 10 ¹⁰ bits transferred	
Unrecoverable Read Errors	Less than 1 in 10 ¹² bits transferred	
Seek Errors	Less than 1 in 10 ⁶ seek operations	

Power Requirements

AC	None
DC	+5 V ($\pm 2\%$), 1.1A -5.2 V ($\pm 2\%$), 2.0A +24 V ($\pm 10\%$), 2.8A (4.5A peak) Less than 102.55 W (350 BTU)

Environmental

Operating Temperature	10°C to 40°C (50°F to 104°F)
Non-Operating Temperature	-40°C to 60°C (-40°F to 158°F)
Operating Humidity	20% to 80% RH
Non-Operating Humidity	5% to 95% RH
Altitude, Sea Level Ref.	
Operating	-300 to +2000 m (-983 to +6560 ft)
Non-Operating	-300 to +3000 m (-983 to +9850 ft)

Physical Characteristics

Height	106 mm (4.16 in)
Width	218 mm (8.57 in)
Depth	362 mm (14.25 in)
Weight	9.53 kg (21 lb)

Specifications subject to change without notice.

Control Data sales offices are located in principal cities throughout the world.

OEM Product Sales
CONTROL DATA CORPORATION
P.O. Box 0
Minneapolis, Minnesota 55440